

Interactive comment on “Importance of secondary sources in the atmospheric budgets of formic and acetic acids” by F. Paulot et al.

Anonymous Referee #1

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General comments

Numerical predictions of oxygenated organic species are highly uncertain. The authors presented a comprehensive modeling study of formic and acetic acids. Their model estimated higher photochemical production of FA than previous studies, which could be associated with the isoprene chemistry. However, the model generally underestimated the FA concentration. Since the isoprene chemistry is calibrated based on the chamber experiments under high NO_x conditions, the underestimates might be expected from the chamber experiments under low NO_x conditions. As such, they conducted sensitivity studies and attributed the underestimates to a lack of a long-lived secondary source of carboxylic acids, which might be associated with the aging of organic aerosols. The work conducted in this paper may contribute to understand the role of organics in the

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atmosphere.

Specific comments

p.24443, l.1: It would be more straightforward that low NO_x chemistry is applied to a global model. The issue of the low NO_x chemistry may need to be addressed in modeling of responses to biogenic sources, although it is noted in p.2448. Please explain why the low NO_x chemistry was not applied here.

p.24443, l.25: How did you estimate the yields (15.5%, 7.5%, and 8%)? Please also show yields for other species to complete the reaction equation.

p.24450, l.3: Please check tables in previous studies. You need to rephrase this sentence, because absolute differences in direct emissions from biomass and biofuel burning are smaller than those in photochemical production.

p.24459, l.13: It is unclear how the summary #3 is associated with the discussions in the section 3. Please explain it.

p.24463, l.17: Please show the equation used to estimate the collision of OH with OA. Are the assumed source strengths of FA and AA consistent with the results from the chamber experiments (Paulot et al., 2009)?

Technical corrections

p.24439, l.18: Define i. Present the unit for E.

p.24439, l.25: Define T.

p.24440, l.5 and l.7: Rephrase “CO” emission, because you cannot calculate FA and AA emissions from CO emissions using the emission factors in Table1.

p.24441, l.21: T is the “soil” temperature.

p.24452, l.10: Fig. S8 should be corrected to “Fig. S7”.

p.24453, l.10: Fig. S6 should be corrected to “Fig. S8”.

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Table 1: Present the references for the emission factors.

Table 2: Present previous estimates for direct emissions of acetic acid (see Table 3 in von Kuhlmann et al., 2003 and Table 2 in Ito et al., 2007) and add them to total sources in parentheses.

Fig.4 caption: Correct "20042008 model range".

Supplement, p.2: Remove "from the" in the first sentence.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 24435, 2010.